US – 362

Sixth Semester B.Sc. Examination, May 2017
(CBCS) (Freshers)
(2016 – 17 & Onwards)
STATISTICS – VII
Applied Statistics – 2

Time : 3 Hours

Max. Marks : 70

Instructions : 1) Answer **five** questions from Section – **A** and **five** questions from Section – **B**.
2) Scientific calculators are **permitted**.

SECTION – A (25 Marks)

I. Answer **any five** questions from the following : (5×5=25)

1) Define reliability function and hazard function. If the linear hazard model is of the form h(t) = a.t, t > 0 and a is a constant, find reliability function R(t) and density function of failure time f(t).

2) a) Define Mean Time to Failure (M.T.T.F.) and obtain M.T.T.F. for exponential distribution with failure time density $f(t) = \lambda e^{-\lambda t}$, t > 0.

b) Write the structure, function and find the reliability of the system :
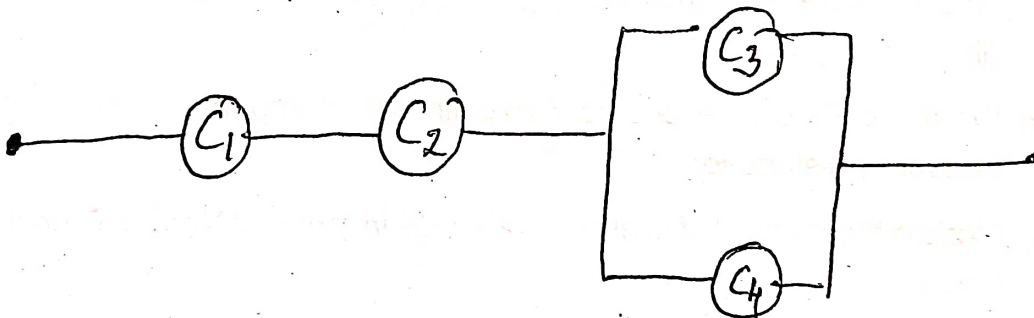
3) Explain the meaning of "scaling" as used in mental tests and discuss any two scaling procedures used in mental tests.

4) Distinguish between :
  i) Therapeutic and prophylactic trials.
  ii) False negative rate and false positive rate.
  iii) Observational and cross sectional studies.

P.T.O.

5) Explain the construction and use of Receiver Operating Characteristic (R.O.C.) curve.

6) Discuss the following :
   i) Elasticity
   ii) Total and marginal utility
   iii) Giffen's paradox.

7) State and prove law of equi-marginal utility for two commodities.

8) a) Mention the activities of Central Statistical Organization (C.S.O.).

   b) What is national income ? Mention the methods of estimating national income.

SECTION – B (45 Marks)

II. Answer **any five** questions from the following : (5×9=45)

9) a) Define "system reliability" and obtain the reliability of a system of η independent components connected in parallel.

   b) Define I.F.R. and D.F.R. distribution and examine this for the distribution whose failure rate function is $h(t) = \alpha\beta t^{\beta-1}$, $t > 0$ for the cases (i) $\beta \geq 1$ (ii) $\beta < 1$.
   (5+4)

10) a) What are Percentile Scores ? Explain their computation for the given frequency distribution.

    b) Explain the method of scaling of rankings in terms of Normal Probability Curve.
    (5+4)

11) a) Distinguish between prospective study and retrospective study. Give an example for each.

    b) Define and interpret the following :
       i) Relative Risk (R.R.)
       ii) Odds Ratio (O.R.)
       iii) Body Mass Index (B.M.I.).
       (3+6)

12) a) Discuss :

    i) Law of demand

    ii) Engel's law.

    Also sketch the law of demand and Engel's curve.

  b) Define price elasticity of demand. Find the demand function if the price elasticity is constant. **(6+3)**

13) a) State the law of diminishing marginal utility. Give an illustration.

  b) If $U = 2q^3 + 13$ is the utility function then find the marginal utility when $q = 5$.

  c) Find equilibrium price and quantity exchanged if the demand and supply curves are $D = 250 - 3p^2$ and $S = p^2 + 2p^4$. **(3+2+4)**

14) a) Discuss the organization of N.S.S.O. and its publications.

  b) Distinguish between national income and per capita income and mention the causes for slow growth rate of national income. **(5+4)**

15) a) Explain :

    i) G.D.P. and G.N.P.

    ii) National income at market prices and at factor prices.

    iii) National Accounts Statistics (NAS) of C.S.O.

  b) What is the per capita income of a country with population of 75 crores and national income of 10,25,000 crores ? **(7+2)**

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Sixth Semester B.Sc. Examination, May 2017
(CBCS)
(Freshers) (2016-17 and Onwards)
STATISTICS – VIII
Operations Research

Time : 3 Hours

Max. Marks : 70

Instructions : i) Answer **five** questions from Section – **A** and **five** questions from Section – **B**.
ii) Scientific calculators are **allowed**.

SECTION – A (25 Marks)

I. Answer **any five** questions from the following : (5×5=25)

1) What is operations research ? Mention its applications.

2) Explain the graphical method of solving a Linear Programming Problem (LPP). Indicate the existence of
   i) Multiple solution
   ii) Unbounded solution
   iii) No solution graphically.

3) For any (2 × 2) two-persons zero-sum game without saddle point, obtain the expressions for optimum strategies and value of the game.

4) a) What is inventory ? In inventory theory, what are controllable and uncontrollable variables ? Give examples.
   b) State the needs for replacement of items. Explain.

5) a) Describe a typical queuing system with a diagram.
   b) Discuss :
      i) Queue discipline   ii) Customer behaviour.

6) State J.D.C. Little's formula and obtain the expressions for the average waiting time of a customer in the
   i) System and   ii) Queue under (M/M/1): (FIFO/∞/∞) model.

7) a) In network analysis, what is meant by an event ? Explain different types of events.
   b) What is meant by independent float of an activity ? Give an expression to compute it.

8) State the difference between PERT and CPM techniques.

P.T.O.

<div align="center">SECTION – B</div> (45 Marks)

II. Answer **any five** questions from the following : (5×9=45)

9) a) Define a basic solution. Obtain all such solutions in the system of equations.

$$x_1+2x_2+x_3 = 4$$
$$2x_1+x_2+5x_3 = 5$$

b) State and prove the necessary and sufficient condition for the existance of a feasible solution to a Transportation Problem (T.P.) (5+4)

10) a) Explain simplex method of solving a L.P.P.

b) Explain North-West corner rule to determine initial basic feasible solution of a T.P. (5+4)

11) a) Distinguish between transportation problem and assignment problem. Show that assignment problem is a particular case of a transportation problem.

b) Explain Hungarian algorithm of solving a assignment problem. (4+5)

12) a) Define the terms :

   i) pay off

   ii) zero sum game

   iii) two person-zero-sum game

   iv) strategy.

b) Explain the graphical method of solving a $(2 \times n)$ game. (4+5)

13) a) Explain the following w.r.t. an inventory problem.

   i) Setup cost ii) Carrying cost

   iii) Shortage cost iv) Lead time

   v) Buffer stock.

b) Obtain an optimum replacement policy for replacing items which deteriorate with time assuming time is continuous. (5+4)

14) a) Distinguish between individual and group replacement and write a note on group replacement policy.

b) Stating the assumptions involved, derive an expression for optimum quantity to be ordered under EOQ model when shortages are not permitted. (4+5)

15) a) Explain forward and backward pass calculations in CPM.

b) Describe time estimates in PERT.

  (6+3)

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